

TOT Tothill Creek Land System

Tothill Creek Valley and its southern extension to Waterloo Plains

Area: 121.3 km²

Annual rainfall: 450 – 550 mm average

Geology: The land system is a north - south valley underlain by siltstones and shales of the Saddleworth and Mintaro Formations. These are extensively overlain by Quaternary alluvium and colluvium, mostly derived from the quartzite ranges which bound the valley on both the western and eastern sides. On upper outwash fans adjacent to the ranges the sediments are gritty and gravelly; on lower fans and creek flats, they are less gravelly and more clayey. Most rocks and sediments are mantled by fine carbonates of aeolian origin.

Topography: The land system is a parallel sided north - south trending valley, bounded on the west by a low quartzite ridge, and on the east by the Tothill Range. Tothill Creek flows southwards down the centre of the valley for about half its length, until it bends westwards through the ridge to join the Light River. In the southern half, numerous small water courses rise and flow through gaps in the ranges or out the southern end on to Waterloo Plains. The topography within the valley comprises gently sloping fans grading to the Tothill Creek flats (in the north) and undulating rises and intervening drainage depressions (in the south). Slopes are less than 10% except for minor moderately steep rocky rises and some steeper footslopes adjacent to the ranges.

Elevation: 550 m in the north to 360 m in the south

Relief: Maximum relief is 30 m

Soils: Moderately deep loam to sandy loam soils, usually with dispersive clay subsoils over weathering rock are extensive on rises, while similar but deeper soils over alluvium dominate lower ground.

Main soils: *Soils formed on basement rock*

D7 Hard loam over dispersive red clay on rock

D1 Hard loam over red clay on rock

Soils formed on alluvium

D3a Hard sandy loam over dispersive red clay

D3b Hard loam over dispersive red mottled clay

Soils formed on deeply weathered rock

D3c Hard sandy loam over dispersive red clay on deeply weathered rock

Minor soils: **C4** Hard gradational loam - over alluvium

L1 Stony sandy loam - on hard rock

E3 Brown cracking clay - on deeply weathered rock

Main features: The Tothill Creek Land System is characterized by undulating rises and creek flats with more than 95% of the land being arable. The soils are dominantly texture contrast types with moderate inherent fertility, but poor soil structure is the outstanding feature of the land. Resulting problems include waterlogging, workability difficulties, patchy emergence/early growth and excessive runoff and erosion on slopes. Saline seepage is widespread in drainage depressions and soil acidity is increasing.



Soil Landscape Unit summary: 13 Soil Landscape Units (SLUs) mapped in the Tothill Creek Land System

SLU	% of area	Main features #
AQB	0.6	Abrupt rocky ridges to 20 m high with slopes of 10-20% formed on quartzite. There is up to 20% surface quartzite and up to 10% reefs of outcropping quartzite. Main soils: <u>stony sandy loam</u> - L1 (E), and <u>hard loam over dispersive red clay on rock</u> - D7 (E). This land is moderately steep, stony, exposed and with mainly shallow soils. The less stony and gentler slopes are arable, but otherwise this is rough grazing land.
DMB DMC DMD	0.3 39.0 1.9	Rises formed on siltstones and shales of the Saddleworth and Mintaro Formations. There are up to 10% surface quartzite, ironstone and siltstone fragments, but negligible rock outcrop. DMB Low rises to 10 m high with slopes of less than 3%. DMC Undulating rises to 30 m high with slopes of 3-12%. There are occasional saline seeps on lower slopes. DMD Rocky upper slopes and crests with slopes of 10-20% and up to 50% of the land non arable due to outcrop and surface stone. Main soils: <u>hard loam over dispersive red clay on rock</u> - D7 (E) and <u>hard loam over red clay on rock</u> - D1 (E), with <u>hard loam over dispersive red mottled clay</u> - D3b (M), <u>brown cracking clay</u> - E3 (M), and <u>stony sandy loam</u> - L1 (M). These soils are moderately deep and moderately fertile, but are generally very poorly structured with hard setting surfaces and dispersive subsoils. These conditions may cause several problems including excessive runoff (and associated erosion), subsurface waterlogging, working difficulty and patchy emergence/early growth. Acidity is also increasing and subsoils salt levels are moderate. However, with appropriate surface management (eg use of gypsum, lime and modified tillage systems), this land is potentially productive.
DZC DZH DZI	11.8 17.5 3.1	Complex of undulating rises formed on siltstones and shales, and outwash fans formed on gravelly outwash sediments from adjacent quartzite ranges. There is up to 20% surface sandstone and quartzite, but negligible rock outcrop. DZC Slopes of 3-10%. DZH Slopes of 3-10% with eroded water courses. DZI Slopes of 10-20% with eroded water courses. Main soils: <u>hard loam over dispersive red clay on rock</u> - D7 (E) and <u>hard loam over red clay on rock</u> - D1 (C) on rises, with <u>hard sandy loam over dispersive red clay (on deeply weathered rock)</u> - D3a/D3c (C), and <u>hard loam over dispersive red mottled clay</u> - D3a (M) on outwash fans. These soils are moderately deep but typically have hard gritty sandy surfaces and poorly structured dispersive subsoils. These properties result in high runoff in places, waterlogging in others, and restrictions on emergence/early growth. The land is also difficult to work due to the hard surface soil and extensive stone cover in places. Soil erodibility is high, so even gentle slopes are highly susceptible to erosion. Acidity is a further potential problem.
ETD	1.4	Rocky rises to 20 m high with slopes of 10-25% and sufficient outcrop and surface stone to prevent cultivation. Main soils: <u>stony sandy loam</u> - L1 (E) and <u>hard loam over dispersive red clay on rock</u> - D7 (E). Most of the land retains tree cover which provides useful stock shelter.
JBL JBO JBb JBe JBj	0.6 4.7 13.5 4.1 1.5	Outwash fans, drainage depressions and creek flats formed on clayey alluvium. JBL Fans with slopes of 2-3% and sporadic (up to 2%) saline seepage. JBO Tothill Creek flats with 2-10% of the land affected by saline seepage. JBb Fans with slopes of 2-3%, eroded water courses and sporadic (up to 2%) saline seepage. JBe Drainage depressions with eroded watercourses and 2-10% of land affected by saline seepage. JBj Saline drainage depressions with eroded water courses. Main soils: <u>hard loam over dispersive red mottled clay</u> - D3b (E) on flats and lower fans and <u>hard sandy loam over dispersive red clay (on deeply weathered rock)</u> - D3b/D3c (E) on upper fans, with <u>hard gradational loam</u> - C4 (L). These soils are deep and moderately fertile but are poorly structured. Waterlogging, working difficulties and emergence/early growth problems are likely. Erosion is a hazard on fans. A significant proportion of the low lying land is saline - this should be monitored. Soil acidification is also a potential problem.

PROPORTION codes assigned to soils within Soil Landscape Units (SLU):

(D) Dominant in extent (>90% of SLU)

(V) Very extensive in extent (60–90% of SLU)

(E) Extensive in extent (30–60% of SLU)

(C) Common in extent (20–30% of SLU)

(L) Limited in extent (10–20% of SLU)

(M) Minor in extent (<10% of SLU)



Detailed soil profile descriptions:

- C4** Hard gradational loam (Hypercalcic, Brown Dermosol)
15 - 25 cm clay loam to light clay grading to a coarsely structured brown heavy clay, calcareous from about 65 cm.
- D1** Hard loam over red clay on rock (Hypercalcic, Red Chromosol)
10 - 30 cm hard ironstone and quartz gravelly loam to clay loam abruptly overlying a well structured red clay, calcareous from about 50 cm, with siltstone at about 70 cm.
- D3a** Hard loam over dispersive red clay (Calcic, Red Sodosol)
20 - 30 cm hard loam to clay loam abruptly overlying a coarsely structured and dispersive red clay, calcareous from about 50 cm, grading to clayey alluvium.
- D3b** Hard loam over dispersive red mottled clay (Hypercalcic, Red Sodosol)
20 - 45 cm hard loam to clay loam abruptly overlying a coarsely structured and dispersive red and brown mottled clay, calcareous from about 65 cm, grading to alluvium.
- D3c** Hard sandy loam over dispersive red clay on deeply weathered rock (Calcic, Red Sodosol)
20 - 60 cm hard (quartzite gravelly on upper fans) sandy loam with a bleached A2 layer, abruptly overlying a coarsely structured dispersive red clay, calcareous from about 60 cm, grading to deeply weathered rock.
- D7** Hard loam over dispersive red clay on rock (Calcic, Red Sodosol)
20 - 35 cm hard quartz and ironstone gravelly silty loam to clay loam abruptly overlying a red coarsely structured dispersive heavy clay, calcareous (in 75% of profiles) from about 60 cm, with shale at about 85 cm.
- E3** Brown cracking clay (Brown Vertosol)
Strongly structured seasonally cracking dark brown clay, becoming coarsely structured, paler coloured and calcareous with depth.
- L1** Stony sandy loam (Lithic, Leptic Tenosol / Rudosol)
Stony sandy loam to loam directly overlying bedrock at less than 50 cm.

Further information: [DEWNR Soil and Land Program](#)

